ICAO

CIRCULAR

CIRCULAR 228-AT/92

1991

REGIONAL DIFFERENCES IN FARES, RATES AND COSTS FOR INTERNATIONAL AIR TRANSPORT 1988

Approved by the Secretary General and published under his authority

INTERNATIONAL CIVIL AVIATION ORGANIZATION
MONTREAL . CANADA

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Table II-l. Estimated average unit passenger revenues by international route group[1], 1988

Route group[2]	Revenue per passenger-kilometre (cents)				Revenue per seat-kilometre (cents)			
		Non-scheduled flights				Non-scheduled flights		
	Scheduled services[3]	All categories	By international scheduled airlines	By other carriers	Scheduled services[3]	All categories	By international scheduled airlines	By other carriers
1. Between North America and Central America/ Caribbean	7.4	4.0	4.0		4.7	3.1	3.1	
2. Between and within Central America and the Caribbean								
3. Between Canada, Mexico and the United States	6.8	4.0	4.0		4.5	3.1	3.1	
4. Between North America/ Central America/Caribbean and South America	7.8	3.9	3.9		4.7	3.3	3.3	
5. Local South America	9.3	12.5	12.5		5.5	7.9	7.9	
6. Local Europe	18.4	5.1	5.0	5.2	11.6	4.4	4.3	4.4
7. Local Middle East	12.9				12.9			
8. Local Africa	11.5	7.1	7.1		6.2	4.6	4.6	
9. Between Europe and Middle East	9.4	5.3	5.1	6.8	5.6	4.4	4.2	5.2
10. Between &rope/Middle East and Africa	8.9	7.6	7.4	7.6	5.7	6.3	5.0	6.6
11. North Atlantic	6.2	4.4	4.2	4.5	4.2	3.8	3.5	3.9
12. Mid Atlantic	6.2	5.8		5.8	4.4	4.7		4.7
13. South Atlantic	7.9	6.4	4.9	6.9	5.1	5.5	4.3	5.8
14. Local Asia/Pacific	8.8	12.2	12.2		6.3	6.4	6.4	
15. Between Europe/Middle East/ Africa and Asia/Pacific	6.8	8.3	8.3		4.8	4.6	4.6	
16. North and Mid Pacific	6.7	4.3	4.3		4.9	3.6	3.6	
17. South Pacific	5.5				3.8			

1. Data for scheduled services, where presented, are considered representative for all airlines operating in the route group concerned. Data for non-scheduled flights represent only carriers for which substantive information was available, and are only presented where they include two or more carriers. The representative nature of the data for both scheduled services and non-scheduled flights is described in Appendix 1 and the margins of uncertainty to be taken into account regarding the scheduled service data are discussed in Appendix 2.
2. More detailed definition of the route groups may be found in Appendix 3 on the reverse of the revenue questionnaire.
3. These figures do not generally include such incidental operating revenues as my be attributed to international passenger traffic. On individual route groups incidental operating revenues not included may represent up to an additional 2 per cent over the average revenue quoted.

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4. Between North America/ Central America/Caribbean and South America	7.8	3.9	3.9		4.7	3.3	3.3	
5. Local South America	9.3	12.5	12.5		5.5	7.9	7.9	
6. Local Europe	18.4	5.1	5.0	5.2	11.6	4.4	4.3	4.4
7. Local Middle East	12.9				12.9			
8. Local Africa	11.5	7.1	7.1		6.2	4.6	4.6	
9. Between Europe and Middle East	9.4	5.3	5.1	6.8	5.6	4.4	4.2	5.2
10. Between &rope/Middle East and Africa	8.9	7.6	7.4	7.6	5.7	6.3	5.0	6.6
11. North Atlantic	6.2	4.4	4.2	4.5	4.2	3.8	3.5	3.9
12. Mid Atlantic	6.2	5.8		5.8	4.4	4.7		4.7
13. South Atlantic	7.9	6.4	4.9	6.9	5.1	5.5	4.3	5.8
14. Local Asia/Pacific	8.8	12.2	12.2		6.3	6.4	6.4	
15. Between Europe/Middle East/ Africa and Asia/Pacific	6.8	8.3	8.3		4.8	4.6	4.6	
16. North and Mid Pacific	6.7	4.3	4.3		4.9	3.6	3.6	
17. South Pacific	5.5				3.8			

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2. More detailed definition of the route groups may be found in Appendix 3 on the reverse of the revenue questionnaire.
3. These figures do not generally include such incidental operating revenues as may be attributed to international passenger traffic. On individual route groups incidental operating revenues not included may represent up to an additional 2 per cent over the average revenue quoted.

2.6 The analyses above relate only to the average unit revenues for all airlines combined on each route group. There can be wide variations around these averages shown among individual airlines. In the case of scheduled services the variation among airlines of the revenue per passenger-kilometre for each route group is shown in Table II-2. For a few route groups the unit revenues for individual airlines do not vary very much from the route group average (for example for routes across the North and South Atlantic-route groups). However, on most route groups the unit revenues differ significantly among airlines, reflecting differing route structures and traffic mix among other factors.

Freight and mail traffic

2.7 Average reported unit freight and mail revenues in 1988 by international route group are presented in Table II-3.

2.8 The first column of data in Table II-3 shows the average revenue per tonne-kilometre performed for all scheduled freight traffic on each route group whether carried on passenger, combination or all-freight aircraft. The variation among route group averages is even more marked than in the case of scheduled passenger traffic, ranging from a high of 81.5 cents in local Europe to a low of 20.5 cents on routes across the North Atlantic. Comparing with data for the previous year, 6 route groups out of the 17 showed some increase while of the remaining 11 route groups, ten showed a decrease. The largest increases were on routes between Canada, Mexico and the United States (from 31.8 to 34.7 cents), between North America/Central America/Caribbean and South America (from 28.3 to 30.6 cents), local South America (from 41.9 to 44.0 cents), between Europe/Middle East and Africa (from 33.7 to 35.4 cents), and across the South Pacific (from 22.4 to 23.8 cents). The largest decreases in revenue yield were recorded for routes between North America and Central America/Caribbean (from 38.4 to 33.8 cents), on routes between and within Central America and the Caribbean (from 58.3 to 45.0 cents), and in local Middle East (from 39.1 to 35.1 cents). The relatively large change in revenue yield on routes involving Central America and the Caribbean should be considered in the context of the low representation of airlines from this area in 1988 (only two airlines compared with five in 1987).

2.9 The second and third columns of data in Table II-3 show the average revenue per tonne-kilometre performed for scheduled freight traffic carried on passenger or combination aircraft and that obtained for-traffic carried on all-freight aircraft. In comparing the two sets of figures it may be seen that the revenue yield from all-freight aircraft is frequently lower than that achieved from passenger and combination aircraft, as the former are more likely to carry large shipments which are subject to quantity discount rates or low specific commodity rates. However, for some route groups where there is large cargo capacity offered at competitive rates on wide-body passenger and combination aircraft (for example on routes across the North Atlantic, in local Asia/Pacific and on routes between Europe/Middle East/Africa and Asia/Pacific), the difference in revenue yield is relatively small.

2.10 The fourth column of-data in Table II-3 shows the average revenue per tonne-kilometre performed for *all* non-scheduled freight traffic on each international route group. The unit revenues among route groups range from a high of 63.2 cents on routes between Europe and the Middle East to a low of 15.0 cents between Europe/Middle East/Africa and Asia/Pacific. The figure for non-scheduled operations is actually higher than that for all-freight scheduled operations for 5 of the 10 comparable route groups. In some cases this reflects the specialized non-scheduled operations of one or two carriers. There were significant changes in average unit revenue between 1987 and 1988 for most of the 8 route groups for which there are comparable data. These changes, in general, occurred in route groups where the non-scheduled freight traffic is relatively small or were otherwise accompanied by a significant change in reported non-scheduled freight traffic over the same period.

2.11 The final column of data in Table II-3 shows the average revenue per tonne-kilometre performed for all mail traffic on each route group (virtually all international mail is carried on scheduled services). The route group averages range from a high of 84.4 cents in local Middle East to a low of 35.4 cents on routes between North America and Central America/Caribbean. Between 1987 and 1988, 12 of the 17 route

Table II-3. Estimated average unit freight and mail revenues by international route group[1], 1988

Route group (short title)	Freight revenue (cents) per tonne-kilometre performed				Mail revenue (cents) per tonne-kilometre performed - scheduled services
	Scheduled services			Non-scheduled flights	
	Over-al 1	Passenger and combination aircraft	All-freight aircraft		
1. North-Central America	33.8	35.5	26.9	42.0	35.4
2. Central America	45.0	48.3	26.1		45.2
3. North America	34.7	35.6	28.7	23.8	43.1
4. North-South America	30.6	30.3	30.9		43.9
5. South America	44.0	55.3	26.4		52.1
6. Europe	81.5	86.0	64.5	29.1	76.9
7. Middle East	35.1	35.9	25.9		84.4
8. Africa	57.4	58.6	22.2		57.6
9. Europe-Middle East	34.0	36.3	29.2	63.2	62.9
10. Europe-Africa	35.4	36.2	32.9	33.4	60.8
11. North Atlantic	20.5	20.9	19.3	24.3	35.3
12. Mid Atlantic	25.4	25.8	16.8		64.6
13. South Atlantic	24.5	25.7	20.0	24.2	61.3
14. Asia/Pacific	36.9	37.1	35.8	34.3	56.9
15. Europe-Asia/Pacific	29.5	30.2	28.4	15.0	48.5
16. North/Mid Pacific	27.7	31.5	26.3	23.6	36.0
17. South Pacific	23.8	24.2	20.6		44.3

1. Data represent only carriers for which substantive information was available and are only presented where they include two or more carriers. The representative nature of the data is described in Appendix 1.

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Route group (short title)	Freight revenue (cents) per tonne-kilometre performed				Mail revenue (cents) per tonne-kilometre performed - scheduled services
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2. Central America	45.0	48.3	26.1		45.2
3. North America	34.7	35.6	28.7	23.8	43.1
4. North-South America	30.6	30.3	30.9		43.9
5. South America	44.0	55.3	26.4		52.1
6. Europe	81.5	86.0	64.5	29.1	76.9
7. Middle East	35.1	35.9	25.9		84.4
8. Africa	57.4	58.6	22.2		57.6
9. Europe-Middle East	34.0	36.3	29.2	63.2	62.9
10. Europe-Africa	35.4	36.2	32.9	33.4	60.8
11. North Atlantic	20.5	20.9	19.3	24.3	35.3
12. Mid Atlantic	25.4	25.8	16.8		64.6
13. South Atlantic	24.5	25.7	20.0	24.2	61.3
14. Asia/Pacific	36.9	37.1	35.8	34.3	56.9
15. Europe-Asia/Pacific	29.5	30.2	28.4	15.0	48.5
16. North/Mid Pacific	27.7	31.5	26.3	23.6	36.0
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group-s show increases in unit mail revenues. The most significant increases were on routes between North America/Central America/Caribbean and South America (from 39.3 to 43.9 cents), local Europe (from 72.6 to 76.9 cents), local Middle East (from 59.2 to 84.4 cents), local Asia/Pacific (from 53.3 to 56.9 cents), between Europe/Middle East/Africa and Asia/Pacific (from 44.1 to 48.5 cents) and across the South Pacific (from 37.3 to 44.3 cents). The relatively large change in revenue yield in local Middle East is in part due to the absence of a major Middle East carrier in the 1987 sample, which significantly affected the revenue yield reported for that year. Decreases were recorded for the remaining 5 route groups. The most significant decreases were recorded on routes between and within Central America and the Caribbean (from 54.9 to 45.2 cents), between Canada, Mexico and the United States (from 48.7 to 43.1 cents), and in local South America (from 62.3 to 52.1 cents). As for freight, the relatively large change in revenue yield on routes between and within Central America and the Caribbean should be considered in the context of the low representation of airlines from this area in 1988. Unit mail revenues in general remain significantly higher than unit freight revenues on scheduled services except for routes between North America and Central America/Caribbean, between and within Central America and the Caribbean, and in local Africa where they were about the same in 1988 and for routes in local Europe, where unit mail revenues were significantly lower than unit freight revenues on scheduled services.

2.12 A notable feature of the mail unit revenue data is that for most of the route groups involving two or more regions there are substantial differences in the yield recorded by the carriers according to the region in which they are based. This distinction is particularly marked for the following route groups and regions: between North America/Central America/Caribbean and South America, all airlines 43.9 cents, North American airlines 31.1 cents, South American airlines 67.3 cents; North Atlantic, all airlines 35.3 cents, North American airlines 27.6 cents, European airlines 52.3 cents; and North/Mid Pacific, all airlines 36.0 cents, North American airlines 27.2 cents Asian airlines 61.2 cents. These differences are to a large extent a result of comparatively low air mail conveyance rates being set by the United States authorities for originating mail.

2.13 In the case of unit freight revenues, the variation among individual airlines of the revenue per tonne-kilometre for scheduled services for each route group is shown in Table II-4. For a few route groups the unit revenues for individual airlines do not vary very much from the route group average (for example on routes across the North, Mid and South Atlantic). However, as for passenger traffic, on most route groups the unit revenues differ significantly among airlines.

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Table III-1. Basic operational data and financial results for scheduled passenger services by international route group, 1988[1]

Route group[2]	Operational data: Number of airlines	Operational data: Percentage of world's international traffic (available seat-kilometres)	Operational data: Average length of flight stages (km)	Operational data: Average number of seats per aircraft[4]	Operational data: Average passenger load factor (%)	Financial results[3]: Average revenue (cents) per passenger-kilometre[5]	Financial results[3]: Average passenger costs (cents) per passenger-kilometre	Financial results[3]: Ratio revenue/costs[5,6]
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
I. All world international routes	212	100.0	1 745	243	68	8.17	7.91	1.03
II. International route groups:								
1. Between North America and Central America/Caribbean	31	3.3	1 219	192	63	7.4	7.9	0.95
2. Between and within Central America and the Caribbean	18	0.2	695	139	-	-		
3. Between Canada, Mexico and the United States	19	4.9	1 079	158	65	6.8	7.2	0.95
4. Between North America/Central America/Caribbean and South America	32	3.3	2 073	233	61	7.8	7.8	1.00
5. Local South America	18	0.6	858	158	59	9.3	10.6	0.90
6. Local Europe	55	9.7	826	133	63	18.4	16.7	1.10
7. Local Middle East	16	1.1	881	182	59	12.9	12.5	1.05
8. Local Africa	35	0.4	909	142	54	11.5	13.4	0.85
9. Between Europe and Middle East	46	3.5	2 056	202	60	9.4	9.9	0.95
10. Between Europe/Middle East and Africa	62	4.9	2 663	240	64	8.9	8.7	1.00
11. North Atlantic	49	23.4	4 162	296	69	6.2	6.3	1.00
12. Mid Atlantic	17	2.0	3 734	266	71	6.2	6.5	0.95
13. South Atlantic	20	2.1	3 648	285	65	7.9	8.0	1.00
14. Local Asia/Pacific	43	9.3	1 711	276	72	8.8	7.7	1.15
15. Between Europe/Middle East/Africa and Asia/Pacific	60	16.8	3 653	310	71	6.8	6.5	1.05
16. North and Mid Pacific	19	11.6	5 540	333	72	6.7	6.4	1.05
17. South Pacific	11	2.9	4 648	344	69	5.5	5.5	1.00

1. Excluding operational and financial data attributed to supersonic and propeller-driven aircraft.
2. More detailed definition of the route groups may be found in Appendix 3 on the reverse of the revenue questionnaire.
3. The margins of uncertainty which should be considered in relation to these results are discussed in Appendix 2. For routes between and within Central America and the Caribbean the representation was inadequate to justify separate presentation, but the data have been included in the world averages.
4. As defined by available seat-kilometres divided by aircraft-kilometres flown.
5. These figures do not generally include incidental operating revenues. For all international routes that part of this additional revenue which may be directly attributed to international passenger traffic is about 0.08 cents per passenger-kilometre. On individual route groups it may represent up to an additional 2 per cent over the average revenue quoted.
6. Rounded to nearest twentieth for individual route groups.

3.7 Components of the total passenger costs are presented in Table III-P. The primary breakdown is between "aircraft" operating costs, being those directly attributable to the operation of aircraft on each route group, and "other" operating costs. All the itemized data carry relatively wide margins of uncertainty and should be regarded as indicative only. Nevertheless, it appears that most of the individual items vary significantly among route groups.

Comparison of results for 1988 with those for 1987

3.8 An over-all comparison between data for 1988 and corresponding data for 1987 shows an increase of about 4 per cent in the estimated passenger cost per available seat-kilometre, from 5.17 to 5.36 cents. Since the world-wide average load factor increased about 1 percentage point, from 67 to 68 per cent, the cost per passenger-kilometre shows an increase of just under 3 per cent, from 7.71 to 7.91 cents. Unit revenues (excluding incidental operating revenues) on the other hand showed an increase of about 5 per cent, from 7.79 cents per passenger-kilometre to 8.17 cents in 1988 and as a result the over-all revenue/cost ratio shows a slight improvement between the two years, increasing from 1.01 in 1987 to 1.03 in 1988.

3.9 As far as the individual route groups are concerned, the year-to-year cost changes show wide variations which are accentuated by differences in trends in load factors. Between 1987 and 1988, thirteen out of the 16 route groups for which comparable data are available showed increases in costs per passenger-kilometre. The most significant increases were recorded on routes in local South America (from 10.0 to 11.1 cents); in local Europe (from 16.0 to 16.7 cents), in local Middle East (from 12.0 to 12.5 cents), in local Asia/Pacific (from 7.3 to 7.7 cents), and across the South Pacific (from 6.1 to 6.4 cents). Two of the remaining three route groups showed no change in unit costs between 1987 and 1988, whereas on routes between Canada, Mexico and the United States there was a decrease in unit costs (from 7.4 to 7.2 cents).

3.10 The comparison of unit costs between 1987 and 1988 reflects a relative stability in the price of fuel (see Chapter IV), with a general increase in other costs. However, as with the revenue figures discussed in Chapter II, the comparison has been in some cases significantly affected by a change in the value of the United States dollar against other world currencies. Within the Americas, where most fares and rates are transacted in United States dollars, the changes in unit revenues generally reflect market changes. Similarly, changes in unit costs in the Americas to a large extent reflect the general increase in costs as well as some operational changes, as the greater part of costs are generally borne in United States dollars.

3.11 Outside the Americas, for those route groups where the mix of national currencies generally strengthened compared with the United States dollar, the increases shown in revenues and costs are in effect inflated, and notably so for route groups involving the Asia/Pacific area. For example, whereas between 1987 and 1988 average unit revenues and costs for routes in local Asia/Pacific showed increases of about 7 and 6 per cent respectively when measured in United States dollars, in terms of local currencies unit revenues are estimated to have remained at the same level as in 1987 and unit costs are estimated to have decreased about 1 per cent. In other areas, such as Europe, the Middle East and Africa, local currency data are sometimes distorted by a relatively large devaluation against the United States dollar of the national currencies of a few countries. Such is the case for routes in local Europe, local Middle East and local Africa where the United States dollar shows an overall strengthening against related currencies between 1987 and 1988. For these route groups, the changes in costs and revenues when these are expressed in United States dollars are lower than those recorded when costs and revenues are expressed in local currencies.

3.12 Of the 16 route groups for which comparable data are available, eight showed an improvement in the revenue/cost ratio between 1987 and 1988. These are: between North America and Central America/Caribbean (from 0.90 to 0.95), between Canada, Mexico and the United States (from 0.85 to 0.95), North Atlantic (from 0.95 to 1.00), South Atlantic (from 0.95 to 1.00), local Asia/Pacific (from 1.10 to 1.15), between Europe/Middle East/Africa and Asia/Pacific (from 1.00 to 1.05), North and Mid Pacific (from 1.00 to 1.05) and across the South Pacific (from 0.95 to 1.00). In the case of routes between North America and Central America/Caribbean, the increase in revenue/cost ratio was

3.7 Components of the total passenger costs are presented in Table III-P. The primary breakdown is between "aircraft" operating costs, being those directly attributable to the operation of aircraft on each route group, and "other" operating costs. All the itemized data carry relatively wide margins of uncertainty and should be regarded as indicative only. Nevertheless, it appears that most of the individual items vary significantly among route groups.

Comparison of results for 1988 with those for 1987

3.8 An over-all comparison between data for 1988 and corresponding data for 1987 shows an increase of about 4 per cent in the estimated passenger cost per available seat-kilometre, from 5.17 to 5.36 cents. Since the world-wide average load factor increased about 1 percentage point, from 67 to 68 per cent, the cost per passenger-kilometre shows an increase of just under 3 per cent, from 7.71 to 7.91 cents. Unit revenues (excluding incidental operating revenues) on the other hand showed an increase of about 5 per cent, from 7.79 cents per passenger-kilometre to 8.17 cents in 1988 and as a result the over-all revenue/cost ratio shows a slight improvement between the two years, increasing from 1.01 in 1987 to 1.03 in 1988.

3.9 As far as the individual route groups are concerned, the year-to-year cost changes show wide variations which are accentuated by differences in trends in load factors. Between 1987 and 1988, thirteen out of the 16 route groups for which comparable data are available showed increases in costs per passenger-kilometre. The most significant increases were recorded on routes in local South America (from 10.0 to 11.1 cents); in local Europe (from 16.0 to 16.7 cents), in local Middle East (from 12.0 to 12.5 cents), in local Asia/Pacific (from 7.3 to 7.7 cents), and across the South Pacific (from 6.1 to 6.4 cents). Two of the remaining three route groups showed no change in unit costs between 1987 and 1988, whereas on routes between Canada, Mexico and the United States there was a decrease in unit costs (from 7.4 to 7.2 cents).

3.10 The comparison of unit costs between 1987 and 1988 reflects a relative stability in the price of fuel (see Chapter IV), with a general increase in other costs. However, as with the revenue figures discussed in Chapter II, the comparison has been in some cases significantly affected by a change in the value of the United States dollar against other world currencies. Within the Americas, where most fares and rates are transacted in United States dollars, the changes in unit revenues generally reflect market changes. Similarly, changes in unit costs in the Americas to a large extent reflect the general increase in costs as well as some operational changes, as the greater part of costs are generally borne in United States dollars.

3.11 Outside the Americas, for those route groups where the mix of national currencies generally strengthened compared with the United States dollar, the increases shown in revenues and costs are in effect inflated, and notably so for route groups involving the Asia/Pacific area. For example, whereas between 1987 and 1988 average unit revenues and costs for routes in local Asia/Pacific showed increases of about 7 and 6 per cent respectively when measured in United States dollars, in terms of local currencies unit revenues are estimated to have remained at the same level as in 1987 and unit costs are estimated to have decreased about 1 per cent. In other areas, such as Europe, the Middle East and Africa, local currency data are sometimes distorted by a relatively large devaluation against the United States dollar of the national currencies of a few countries. Such is the case for routes in local Europe, local Middle East and local Africa where the United States dollar shows an overall strengthening against related currencies between 1987 and 1988. For these route groups, the changes in costs and revenues when these are expressed in United States dollars are lower than those recorded when costs and revenues are expressed in local currencies.

3.12 Of the 16 route groups for which comparable data are available, eight showed an improvement in the revenue/cost ratio between 1987 and 1988. These are: between North America and Central America/Caribbean (from 0.90 to 0.95), between Canada, Mexico and the United States (from 0.85 to 0.95), North Atlantic (from 0.95 to 1.00), South Atlantic (from 0.95 to 1.00), local Asia/Pacific (from 1.10 to 1.15), between Europe/Middle East/Africa and Asia/Pacific (from 1.00 to 1.05), North and Mid Pacific (from 1.00 to 1.05) and across the South Pacific (from 0.95 to 1.00). In the case of routes between North America and Central America/Caribbean, the increase in revenue/cost ratio was

solely due to a small improvement in the passenger load factor. In all other cases unit revenues showed a more favourable development than unit costs (expressed in terms of cents per seat-kilometre). On routes between Canada, Mexico and the United States, across the South Atlantic, and the North and Mid Pacific, the increase in the average passenger load factor (2 percentage points in each case) also contributed to the increase in the revenue/cost ratio between 1987 and 1988.

3.13 Of the remaining eight route groups, two showed a reduction in the revenue/cost ratio, while the change in the ratio of the remaining six route groups was not significant. The route groups which showed a decrease in revenue/cost ratio were local South America (from 0.95 to 0.90) and local Middle East (from 1.10 to 1.05). In both cases the most significant factor was a less favourable development in unit revenues than unit costs, despite a small improvement in load factors (2 percentage points for routes in local South America and one percentage point for those in local Middle East). In the case of local South America, as in 1987 the increase in unit costs can in part be attributed to the increase in the aircraft operating costs of the South American carriers. In addition between 1987 and 1988 there was a significant increase in the costs for commissions, ticketing, sales and promotion for these carriers. In local Middle East, the change in the revenue/cost ratio was mainly caused by a decrease in unit revenues which was not matched by a corresponding change in unit costs.

Variations in revenue/cost ratios among airlines

3.14 The over-all financial results in Table III-1 show that differences in revenues between route groups broadly reflect differences in costs. However, there are cases where individual airlines earn significant profits on some route groups while incurring losses on other route groups, and operations of these airlines on the former route groups could therefore be said to have subsidized operations on the latter groups during the period in question. In studies covering previous years, such apparent cross-subsidy between route groups applied not only in the case of individual airlines but carried across to the averages for some regional groups of airlines. Since 1983, however, no such consistent cross-subsidy has been identifiable.

3.15 Analysis did, however, reveal several route-groups within which the results obtained by different regional groups of airlines show significant differences. The figures shown below represent the unrounded revenue/cost ratio for each carrier group; however these figures should be used with caution because of the relatively large margin of uncertainty associated with them (see Appendix 2, paragraph 22).

3.16 As in previous years on routes between Europe/Middle East and Africa, European airlines as a group continued to achieve a relatively high revenue/cost ratio (1.11). In contrast, as a group, the African carriers operating these routes continue to show relatively poor results with a revenue/cost ratio of 0.92. Between 1987 and 1988, there was little change in the revenue/cost ratio achieved by the carriers operating routes between Europe and the Middle East, where the European airlines as a group continue to show a revenue/cost ratio some 0.10 points below that of the Middle East airlines (0.89 against 1.00). On routes between Europe/Middle East/Africa and Asia/Pacific, there was an improvement in the revenue/cost ratio of both the European and Asia/Pacific airlines (some 0.08 points), and thus the former group continued to show a revenue/cost ratio some 0.05 points above that of the Asia/Pacific airlines (1.10 against 1.05).

3.17 On routes across the North and Mid Pacific, the Asia/Pacific airlines as a group show a revenue/cost ratio some 0.19 below that of the North American airlines (0.96 against 1.15). The improvement over 1987 in the revenue/cost ratio of the latter group (from 1.03 to 1.15) is mainly due to a more favourable development of both unit revenues and unit costs than those for the Asia/Pacific airlines. On routes across the South Pacific however, the Asia/Pacific airlines show a significantly improved revenue/cost ratio over 1987 (from 0.85 to 0.96), while the North American carriers show a small decrease (from 1.08 to 1.05) due, in part, to an unfavourable unit revenue development.

3.18 In 1988 the South American airlines show mixed results: a 0.05 point reduction over 1987 in the revenue/cost ratio on routes between North America/Central America/Caribbean and South America (from 1.02 to 0.97) and a 0.04 point increase on routes across the South Atlantic (from 0.95 to 0.99). These figures compare with

solely due to a small improvement in the passenger load factor. In all other cases unit revenues showed a more favourable development than unit costs (expressed in terms of cents per seat-kilometre). On routes between Canada, Mexico and the United States, across the South Atlantic, and the North and Mid Pacific, the increase in the average passenger load factor (2 percentage points in each case) also contributed to the increase in the revenue/cost ratio between 1987 and 1988.

3.13 Of the remaining eight route groups, two showed a reduction in the revenue/cost ratio, while the change in the ratio of the remaining six route groups was not significant. The route groups which showed a decrease in revenue/cost ratio were local South America (from 0.95 to 0.90) and local Middle East (from 1.10 to 1.05). In both cases the most significant factor was a less favourable development in unit revenues than unit costs, despite a small improvement in load factors (2 percentage points for routes in local South America and one percentage point for those in local Middle East). In the case of local South America, as in 1987 the increase in unit costs can in part be attributed to the increase in the aircraft operating costs of the South American carriers. In addition between 1987 and 1988 there was a significant increase in the costs for commissions, ticketing, sales and promotion for these carriers. In local Middle East, the change in the revenue/cost ratio was mainly caused by a decrease in unit revenues which was not matched by a corresponding change in unit costs.

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revenue/cost ratios of 1.06 (up from 1.04 in 1987) for the North American airlines on routes between North and South America, and 1.00 (up from 0.95) for the European airlines on routes across the South Atlantic.

3.19 An examination was also carried out as to how the revenue/cost ratios varied among individual airlines operating in the same route group. These variations in revenue/cost ratios among airlines on a route group can be an important factor in the negotiation of fares for the route group in question, particularly where unanimity or some form of consensus among the airlines is required on proposed fares.

3.20 The variations in 1988 are shown in Table III-3. On a few route groups the revenue/cost ratios for the airlines do not vary very much from the route group average (for example in local Europe). However, on most route groups the ratios vary significantly among the airlines and the average revenue/cost ratios do not therefore adequately portray the economics of the operations. On three route groups the revenue/cost ratios of individual carriers ranged from less than 0.7 to greater than 1.3 on routes between Europe and the Middle East, across the North Atlantic and between Europe/Middle East/Africa and Asia/Pacific.

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Table IV-l. Operational and cost data for aircraft categories 1988
(international scheduled passenger services)

Grouping of subsonic aircraft	Primary jet types operated on international scheduled services[1]	Percentage of world's international traffic (available seat-km) (%)	Average number of seats[2]	Average length of flight stages operated (km)	Average utilization[3] (hours/day)	Aircraft operating costs[4]	
						Dollars per block hour	Cents per available seat-km[5]
ALL		100.0	243	1 745	9.0	4 150	2.2
Narrow-body, short-haul	B737 B757 DC9 MD80	9.0	116	793	7.4	2 300	3.5
Narrow-body, medium-haul	B727 TU154	8.4	149	1 112	7.4	2 360	2.5
Narrow-body, long-haul	B707 DC8 IL62	3.0	165	2 555	6.2	2 790	2.0
Wide-body, medium-haul	A300 A310 B767 IL86 L1011	15.8	235	1 942	8.6	4 440	2.5
Wide-body, long-haul	B747 DC10 L1011-500	63.8	331	4 175	11.1	5 940	1.9

1. Only aircraft types providing more than 0.5 per cent of the world international scheduled available seat-kilometres in 1988 are listed in this column. The categorization of aircraft types is based on the average number of seats and average length of flight stages operated in 1988.
2. Available seat-kilometres divided by aircraft-kilometres flown.
3. Including domestic and non-scheduled operations of the international airlines concerned.
4. Data in these columns include flight operations expenses, aircraft fuel and oil (at the world average cost of 16.7 cents per litre), aircraft maintenance and overhaul, and aircraft standing charges such as depreciation and interest charges. If prevailing regional prices rather than the world average price were to be used for aircraft fuel and oil there would be no change in the per seat-kilometre cost data presented, but small changes in some of the per block hour data.
5. Aircraft operating costs have been adjusted in this case to exclude costs attributable to freight and mail traffic.

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Table IV-2. Aircraft operational data by route group, 1988

Route group (short title)	Average length of flight stage (km)	Average block speed (km/h)	Percentage distribution of seat-kilometres		Average aircraft productivity : available seat-kilometres per block hour (thousands)
			Narrow-body	Wide-body	
I. All world international routes	1 745	661	20	80	160
II. International route groups:					
1. North-Central America	1 219	614	46	54	118
2. Central America	695	584	99	1	81
3. North America	1 079	584	77	23	92
4. North-South America	2 073	712	27	73	166
5. South America	858	580	72	28	92
6. Europe	826	523	85	15	70
7. Middle East	881	523	42	58	95
8. Africa	909	607	61	39	86
9. Europe-Middle East	2 056	650	28	72	131
10. Europe-Africa	2 663	708	17	83	170
11. Forth Atlantic	4 162	756	3	97	224
12. Mid Atlantic	3 734	756	13	87	200
13. South Atlantic	3 648	790	5	95	229
14. Asia/Pacif ic	1 711	670	8	92	185
15. Europe-Asia/Pacific	3 653	731	4	%	227
16. North/Mid Pacific	5 540	793	2	98	264
17. South Pacific	4 648	787	4	%	271

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Table IV-4. Estimated unit fuel prices and airport charges by route group, 1988 (international scheduled services)

Route group (short title)	Aircraft fuel and oil prices (cents/litre)	Landing and associated airport charges (dollars/departed tonne[1])
I. All world international routes	16.7	8.1
II. International route groups:		
1. North-Central America	16.7	3.6
2. Central America	–	–
3. North America	14.6	2.2
4. North-South America	20.1	5.1
5. South America	22.7	5.5
6. Europe	15.6	15.4
7. Middle East	18.4	4.1
8. Africa	28.7	6.4
9. Europe-Middle East	17.2	8.3
10. Europe-Africa	20.3	8.0
11. Forth Atlantic	14.7	6.7
12. Mid Atlantic	19.2	6.7
13. South Atlantic	20.3	6.6
14. Asia/Pacific	17.7	7.9
15. Europe-Asia/Pacific	17.3	7.5
16. North/Mid Pacific	16.4	8.0
17. South Pacific	16.0	4.4

1. Tonnes of aircraft maximum take-off weight.

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I. All world international routes	16.7	8.1
II. International route groups:		
1. North-Central America	16.7	3.6
2. Central America	–	–
3. North America	14.6	2.2
4. North-South America	20.1	5.1
5. South America	22.7	5.5
6. Europe	15.6	15.4
7. Middle East	18.4	4.1
8. Africa	28.7	6.4
9. Europe-Middle East	17.2	8.3
10. Europe-Africa	20.3	8.0
11. Forth Atlantic	14.7	6.7
12. Mid Atlantic	19.2	6.7
13. South Atlantic	20.3	6.6
14. Asia/Pacific	17.7	7.9
15. Europe-Asia/Pacific	17.3	7.5
16. North/Mid Pacific	16.4	8.0
17. South Pacific	16.0	4.4

1. Tonnes of aircraft maximum take-off weight.

Table IV-5. Contributions to differences in costs among route groups, 1988

Route group (short title)	World average total passenger operating costs	Effect of aircraft mix on direct operating costs	Effect of stage length and average block speed	Effect of air craft fuel and oil prices	Effect of landing and associated airport charges	Effect of load factor	Sum of effects in columns 2-6	Effect of other factors	Actual total passenger operating costs: columns 1+7+8
	(Cents per passenger-kilometre)								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
I. All world international routes	7.9			-	-	-			7.9
II. International route groups:									
1. North-Central America	7.9	0.4	0.8	0.0	-0.2	0.4	1.4	-1.4	7.9
2. Central America									
3. North America	7.9	0.7	1.2	-0.1	-0.2	0.2	1.8	-2.5	7.2
4. North-South America	7.9	0.0	-0.4	0.2	-0.1	0.6	0.3	-0.4	7.8
5. South America	7.9	0.4	1.7	0.4	-0.1	1.0	3.4	-0.7	10.6
6. Europe	7.9	1.3	2.2	-0.1	0.3	0.9	4.6	4.2	16.7
7. Middle East	7.9	0.4	2.1	0.1	-0.2	1.2	3.6	1.0	12.5
8. Africa	7.9	0.9	1.4	0.7	-0.1	2.1	5.0	0.5	13.4
9. Europe-Middle East	7.9	0.4	-0.1	0.0	0.0	0.8	1.1	0.9	9.9
10. Europe-Africa	7.9	-0.2	-0.6	0.2	0.0	0.4	-0.2	1.0	8.7
11. North Atlantic	7.9	-0.3	-1.1	-0.1	-0.1	-0.1	-1.7	0.1	6.3
12. Mid Atlantic	7.9	-0.3	-1.1	0.2	-0.1	-0.2	-1.5	0.1	6.5
13. South Atlantic	7.9	-0.4	-1.2	0.2	-0.1	0.3	-1.2	1.3	8.0
14. A&/Pacific	7.9	0.0	0.0	0.1	0.0	-0.3	-0.2	-0.0	7.7
15. Europe-A/Pacific	7.9	-0.3	-0.9	0.0	0.0	-0.2	-1.4	0.0	6.5
16. North/Mid Pacific	7.7	-0.4	-1.4	0.0	0.0	-0.3	-2.1	0.6	6.4
17. South Pacific	7.9	-0.4	-1.3	0.0	-0.1	-0.1	-1.9	-0.5	5.5

Table IV-5. Contributions to differences in costs among route groups, 1988

Route group (short title)	World average total passenger operating costs	Effect of aircraft mix on direct operating costs	Effect of stage length and average block speed	Effect of aircraft fuel and oil prices	Effect of landing and associated airport charges	Effect of load factor	Sum of effects in columns 2-6	Effect of other factors	Actual total passenger operating costs: columns 1+7+8
	(Cents per passenger-kilometre)								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
I. All world international routes	7.9			-	-	-			7.9
II. International route groups:									
1. North-Central America	7.9	0.4	0.8	0.0	-0.2	0.4	1.4	-1.4	7.9
2. Central America									
3. North America	7.9	0.7	1.2	-0.1	-0.2	0.2	1.8	-2.5	7.2
4. North-South America	7.9	0.0	-0.4	0.2	-0.1	0.6	0.3	-0.4	7.8
5. South America	7.9	0.4	1.7	0.4	-0.1	1.0	3.4	-0.7	10.6
6. Europe	7.9	1.3	2.2	-0.1	0.3	0.9	4.6	4.2	16.7
7. Middle East	7.9	0.4	2.1	0.1	-0.2	1.2	3.6	1.0	12.5
8. Africa	7.9	0.9	1.4	0.7	-0.1	2.1	5.0	0.5	13.4
9. Europe-Middle East	7.9	0.4	-0.1	0.0	0.0	0.8	1.1	0.9	9.9
10. Europe-Africa	7.9	-0.2	-0.6	0.2	0.0	0.4	-0.2	1.0	8.7
11. North Atlantic	7.9	-0.3	-1.1	-0.1	-0.1	-0.1	-1.7	0.1	6.3
12. Mid Atlantic	7.9	-0.3	-1.1	0.2	-0.1	-0.2	-1.5	0.1	6.5
13. South Atlantic	7.9	-0.4	-1.2	0.2	-0.1	0.3	-1.2	1.3	8.0
14. A&/Pacific	7.9	0.0	0.0	0.1	0.0	-0.3	-0.2	-0.0	7.7
15. Europe-A&/Pacific	7.9	-0.3	-0.9	0.0	0.0	-0.2	-1.4	0.0	6.5
16. North/Mid Pacific	7.7	-0.4	-1.4	0.0	0.0	-0.3	-2.1	0.6	6.4
17. South Pacific	7.9	-0.4	-1.3	0.0	-0.1	-0.1	-1.9	-0.5	5.5

APPENDIX 1. DATA SOURCES AND COVERAGE

Sources of the data

1. Primary sources of information for this study were two questionnaires which were dispatched (under cover of State Letter EC 2/20.3.2-89158 of 21 June 1989) to all Contracting States to be filled out with respect to their international carriers. One questionnaire sought information on scheduled and non-scheduled passenger, freight, mail and incidental revenues for each route group, together with corresponding volumes of traffic and capacity. Replies to this questionnaire were received with respect to 73 States. The second questionnaire sought information on costs for international scheduled passenger airlines, and replies were received with respect to 75 States. Facsimiles of the two questionnaires and a list of States for which replies were received are given in Appendix 3.

2. Another important source of information as far as scheduled operations were concerned was a computer analysis of timetable material prepared by publishers of the Official Airline Guide. The basic data provided by this source were, for each and every airline and aircraft type operating in each of the route groups, information on the planned number of seats (combination aircraft), number of departures, aircraft block hours and distance flown (these data are Copyright 1990 by Official Airline Guides, Inc., Oak Brook, Illinois). The ICAO Secretariat carried out research into the operating characteristics of aircraft types and sub-types, and provided Official Airline Guides with resulting data on fuel consumption per block hour (as a function of stage length), maximum take-off weight, payload and volumetric capacity. This information was related to the basic data to provide a bank of operating statistics for each route group and for each geographical area of operation within each route group, as well as aggregate statistics for each area and for the world as a whole.

3. A wide range of supplementary information sources was used, in particular data on airline traffic, traffic by flight stage, on-flight origin and destination traffic, fleet and personnel, and airline financial data regularly filed by Contracting States on Air Transport Reporting Forms and published in the ICAO Digests of Statistics.

Coverage of the data

4. For scheduled services, traffic, capacity and other operational data were derived both from the questionnaires and from the timetable material, supplemented by material from the regular statistical reports to ICAO, and may be considered as fully comprehensive of all international operations. Revenue and cost data originate essentially from the questionnaires, supplemented by national publications or other suitable sources of financial data where available; in the case of passenger traffic available revenue and cost data were adapted according to operational data to render them representative of all international operations (see Appendix 2). In the case of non-scheduled traffic, the sole source of both operational and financial data was the responses to the questionnaires, and the results shown in this study represent only these responses.

5. The study was based on revenue data obtained for 84 scheduled airlines (including 2 all-cargo airlines) and 17 other carriers (including 2 all-cargo), and on cost data for 74 scheduled passenger airlines.

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REPRESENTATIVE NATURE OF REVENUE AND COST DATA FOR SCHEDULED PASSENGER OPERATIONS, 1988

Table A1-1. Representation by ICAO region of airline registration

Region	International scheduled available seat-kilometres (millions)	Revenue data represent			Cost data represent		
		Number of airlines	Available seat-kilometres		Number of airlines	Available seat-kilometres	
			No. (millions)	% of total		No. (millions)	% of total
All	1 121 286	82	975 226	87	74	953 415	85
Africa	48 748	13	32 637	67	12	32 575	66
Asia/Pacific	290 630	16	266 920	92	16	266 920	92
Europe	384 294	25	340 137	89	20	322 338	84
Middle East	60 533	5	40 776	67	4	38 375	63
North America	265 699	12	255 626	%	12	255 626	%
Central America/ Caribbean	27 078	3	12 525	46	2	10 976	41
South America	44 304	8	26 605	60	8	26 605	60

Source: ICAO, Form A-1.

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Source: ICAO, Form A-1.

Table A1-3. Representative nature of revenue data for non-scheduled passenger operations, 1988, by ICAO region of carrier registration

Region	International non-scheduled passenger-kilometres performed (millions)			Revenue data represent								
				All carriers			International scheduled airlines			Other carriers		
	By all carriers	By international scheduled airlines	By other carriers	Number of carriers	Pass-km No. (millions)	% of total performed	Number of carriers	Pass-km No. (millions)	% of total performed	Number of carriers	Pass-km No. (millions)	% of total performed
All	162 236	80 761	81 475	66	69 491	43	49	28 224	35	17	41 267	51
Africa	4 117	4 117	(Note 1)	7	2 773	67	7	2 773	67			
Asia/Pacific	2 991	2 991	(Note 1)	10	1 992	67	10	1 992	67			
Europe	126 746	55 474	71 272	30	54 817	43	14	15 268	28	16	39 549	55
Middle East	1 569	1 238	331	2	179	11	2	179	14			
North America	24 967	15 477	9 490	12	9 563	38	11	7 845	51	1	1 718	18
Central America/ Caribbean	1 182	1 182	(Note 1)	2	17	1	2	17	1			
South America	664	282	382	3	150	23	3	150	53			

1. Less than 0.5 million.

Source: ICAO, Form A-1 and A-2.

Table A1-3. Representative nature of revenue data for non-scheduled passenger operations, 1988, by ICAO region of carrier registration

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1. Less than 0.5 million.

Source: ICAO, Form A-1 and A-2.

Table A2-1. Procedures used to allocate individual airline costs among route groups

category of costs	Cost item (see note 1)		Airline data input to the study	Cost allocation criteria
A. Cost related primarily to aircraft type	I.1	Flight operation expenses, excluding fuel and oil costs	System-wide costs and system-wide block hours flown for each aircraft type operated	I.1-I.4 Number of block hours flown by each aircraft type on each route group
	I.2	Aircraft maintenance and overhaul expenses		
	I.3	Aircraft depreciation and amortization costs		
	I.4	Interest charges on aircraft		
B. Costs related significantly both to aircraft type and geographical area of operation	II.1	Aircraft fuel and oil costs	Either:	II.1 Fuel consumption by each aircraft type in each area of operation
	II.2	Landing and associated an-port charges	a) costs by geographical area of operation, or	II.2 Maximum take-off weight times number of departures for each aircraft type in each ares of operation
	II.3	En-route facility charges	b) costs by route group (no allocation to route group necessary), or	II.3 Maximum take-off weight times number of block hours flown for each aircraft type in each area of operation
	II.4	Otter station expenses	c) costs by aircraft type	II.4 Maximum payload times number of departures for each aircraft type in each area of operation
C. Costs related significantly to volume of traffic or volume of capacity	III.1	Passenger service costs	System-wide costs	III.1 Number of seat-hours on each route group
	III.2	Commission payments		III.2 Total revenue earned from each route group
	III.3	Other ticketing, sales and promotion costs		III.3 Total revenue earned from each route group
	III.4	General and administrative expenses		III.4-IV.1 Number of tonne-kilometres performed in each route group
	III.5	Miscellaneous operating expenses		
	IV.1	Balance of miscellaneous non-operating items (excluding payments from public funds and balance of income from affiliated companies)		

1. Cost item references are those used in the cost questionnaire (see Appendix 3). The items themselves are described in the Reporting Guidelines on the reverse of the cost questionnaire.

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category of coats	Cost item (see note It		Airline data input to the study	Cost allocation criteria
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	I.2	Aircraft maintenance and overhaul expenses		
	I.3	Aircraft depreciation and amortization costs		
	I.4	Interest charges on aircraft		
B. Costs related significantly both to aircraft type and geographical area of operation	II.1	Aircraft fuel and oil coats	Either :	II.1 Fuel consumption by each aircraft type in each area of operation
	II.2	Landing and associated an-port charges	a) coats by geographical area of operation, or	II.2 Maximum take-off weight times number of departures for each aircraft type in each area of operation
	II.3	En-route facility charges	b) costs by route group (no allocation to route group necessary), or	II.3 Maximum take-off weight times number of block hours flown for each aircraft type in each area of operation
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	III.3	Other ticketing, sales and promotion costs		III.3 Total revenue earned from each route group
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1. Cost item references are those used in the cost questionnaire (see Appendix 3). The items themselves are described in the Reporting Guidelines on the reverse of the cost questionnaire.

14. For some route groups where airlines of a particular region have a very low representation (such as Central America and the Caribbean., and- South America), the grossing-up process for revenues and costs was adjusted to take into account the revenues and costs of major non-reported airlines on the basis of data provided for previous studies as well as data regularly collected for ICAO Digests of Statistics.

Margins of uncertainty

15. General. It is important to recognize that the revenue and cost data presented in this Circular are not perfectly defined quantities, but involve margins of uncertainty* Such margins of uncertainty are inherent in any presentation of airline financial data which covers a multiplicity of currencies, which involves disaggregation of system-wide revenues and costs, or which has an incomplete data base. Hence an important feature of the method used in-this series of studies has been to identify and evaluate the various sources of uncertainty for the purpose of establishing the degree of precision in the published data and hence the constraints on drawing conclusions from these data. The evaluations concerned were carried out by means of statistical analysis of detailed airline data and by means of tests as to the sensitivity of the published data to the procedures used in the study. The resulting assessments of margins of uncertainty in average unit revenues, average unit costs and average revenue/cost ratios published in this study for scheduled passenger traffic in 1988 are presented below.

16. Estimates of unit revenues. The margin of uncertainty on the estimated unit revenues for a route group arises from limitations on the quality of reported data, from exchange rate fluctuations and, for scheduled passenger traffic, from the assumption that the average yield for non-reported airlines is the same as that for reported airlines on the same route group. An analysis was carried out to evaluate each of these sources of uncertainty and their cumulative effect) thus producing composite margins of uncertainty for the various route groups. The conclusion was that the estimated scheduled passenger revenue per passenger-kilometre for almost al1 the route groups presented can be relied upon to ±6 per cent. However, caution should be exercised when interpreting the revenue (and cost) data for routes in local South America due to the relatively low representation in that route group. For routes between and within Central America and the Caribbean, the representation was such as to throw some doubt on the validity of the results for that route group, and hence the revenue (and cost) figures for that route group are not presented in this Study although their estimates are included in the worldwide totals. A significantly narrower margin of uncertainty than ±6 per cent applies for those route groups where the representation was relatively high. On a global basis, taking into account all route groups as a whole, the margin of uncertainty is reduced by compensatory effects and by scale, and is estimated at ±3 per cent.

17. Estimates of unit costs. The estimates of unit passenger costs for a route group contain similar elements of uncertainty as those for passenger revenues, plus further elements which arise from the need to allocate costs among route groups according to standardized procedures. These additional sources of uncertainty arise because:

a) the generic nature of some cost items (for example general administrative costs) makes their allocation among route groups a matter of convention; and

b) even for those cost items which are region or route-specific, the standardized allocation procedures do not take into account the detailed conditions under which individual airlines operate.

18. As for the revenue data, a composite margin of uncertainty was developed in respect of the average unit costs for each route group and for all route groups together : With the exception of routes in local Africa, where there is a significant variation in unit costs among the reporting carriers, the margin of uncertainty on the estimated scheduled passenger costs per passenger-kilometre for all the other route groups presented is considered to be within ±10 per cent. Route groups with high representation show a somewhat narrower margin of uncertainty. On a global basis, taking into account all route groups as a whole, the margin of uncertainty in the average costs per passenger-kilometre is estimated at ±5 per cent.

19. On route groups where the margin of uncertainty approaches ±10 per cent the contribution of different sources of uncertainty is approximately as follows:

Source of uncertainty	Relative contribution to margin of uncertainty
Incomplete cost data base	3
Generic nature of certain costs and use of standardized allocation procedures	3
Fluctuations in currency exchange rates	2
Other (primarily imperfections in reported data)	2
All	10

20. Much of the uncertainty arising from the generic nature of certain costs is inherent and cannot be influenced (see paragraph 17), and little can be done to reduce the uncertainty arising from fluctuations in currency exchange rates. A major factor in these studies is therefore getting as much coverage of financial data as possible, while at the same time making efforts to improve the quality of reported data.

21. All the above estimates of uncertainty apply only to over-all average cost data (as presented in Chapter III, Table III-l). Estimates of individual elements making up the over-all cost are in a number of cases subject to wider margins of uncertainty.

22. Estimates of revenue/cost ratios. The estimated ratios of revenues to costs have margins of uncertainty which vary from route group to route group depending on the margins of uncertainty in the estimated revenue and cost data. It should be noted, however, that the uncertainties in the revenue and the cost figures for a route group are to some extent inter-dependent; in other words, if the revenue on a route group is over-estimated, the cost figure is also probably over-estimated. This circumstance reduces the margin of uncertainty in the revenue/cost ratios compared with those for either the revenue data alone or the cost data alone. The composite margin of uncertainty for the revenue/cost ratio for individual route groups in this study is estimated at ±5 per cent, and for all the route groups together it is estimated at ±2.5 per cent.

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